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**COMPOSITION, APPARATUS, AND METHOD OF
CONDITIONING SCALE ON A METAL SURFACE**

CROSS REFERENCE TO RELATED APPLICATION

This application is a divisional of application Serial No. 09/469,687, filed December 22,1999.

FIELD OF THE INVENTION

This invention relates generally to conditioning of oxide or scale on a metal surface; more particularly on a strip of metal, and yet more particularly, to conditioning of oxide surfaces or scale on a stainless steel strip. Stainless steels are ferrous alloys containing more that about 10% chromium for the purpose of enhancing corrosion and oxidation resistance. Some stainless steels also contain nickel, molybdenum, silicon, manganese, aluminum, carbide formers and other elements. This invention is also applicable to families of alloys including superalloys where nickel is the predominant element, titanium alloys and cobalt alloys. In even more particular aspects, this invention relates to aqueous spray conditioning.

BACKGROUND OF THE INVENTION

Descaling of metal strip, especially stainless steel strip, has taken many forms in the past. The simplest technique involves only the pickling of the strip in mineral acid such as sulfuric acid, hydrochloric acid, hydrofluoric acid, nitric acid, or mixtures thereof. This may work with some grades of stainless steel with very light scale; however, in most cases more is needed than just an acid pickle. In those cases, various compositions and techniques have been developed to condition the scale before acid pickling. Typical compositions for scale conditioning include mixtures of alkali metal hydroxides and alkali metal nitrates with various other additives, such as alkali halides, carbonates, and/or other oxidizing agents. These are often referred to as descaling or scale conditioning salts. A conventional technique for using such compositions is in the fused anhydrous state in a pot at elevated temperatures, e.g. 800°F to 1000 °F, through which the strip is passed, followed by an acid pickle. While this works well in many cases, nevertheless there are certain drawbacks to this technique in some instances. For example, the bath has to be maintained at elevated temperatures, which may be energy